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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/075,754	02/14/2002	Anthony Petrovich	DR-338J	3391
7590 02/03/2005			EXAMINER	
Iandiorio & Teska 260 Bear Hill Road Waltham, MA 02451-1018			DEB, ANJAN K	
			ART UNIT	PAPER NUMBER
			2858	

DATE MAILED: 02/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/075,754	PETROVICH ET AL.	
	Examiner	Art Unit	
	Anjan K Deb	2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 November 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 and 16-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to RCE filed on 11/29/2004, and amendment filed on 09/29/2004

Response to Arguments

2. Applicant has amended independent claims 1,17,18,20,31,32 to include the limitation "flexure plate sensor". In response to applicants' arguments that prior art lacks sensor readout circuit that includes a phase detector circuit responsive to an output signal from flexure plate wave sensor and an input signal to the flexure plate wave sensor. The prior art combination cited in this office action disclose this feature.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4, 7-8, 10-12, 16-18, 20-24, 27, 28-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Duncan (US 6,041,642) in view of Smith (US 6,106,149 A).

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Re claims 1, 17-18, 20-21, 30-32, Duncan discloses sensor readout circuit (Fig. 1) which provides frequency signal output (Fig. 3), the readout circuit comprising phase detector circuit 11 responsive to an output signal from a sensor 10 and an input signal to the sensor and configured to detect the phase difference θ_a between the input signal V_o and the output signal V_{in} , and a drive circuit 13,14 responsive to the phase detector circuit and configured to maintain a fixed phase difference between the input signal and the output signal, and a processing circuit 34 (Fig. 2) responsive to the output signal and configured to detect resonant frequency changes (column 5 lines 24-35) of the sensor due to mass changes (oscillating mass) (column 1 lines 25-27, column 4 lines 15-26) to measure mass loading.

Duncan lacks flexure plate wave sensor.

Smith disclose flexure wave sensor for measuring mass changes due to mass loading on a flexure plate by detecting resonant frequency changes and producing a measurement signal based on the resonant frequency.

At the time of the invention it would have been obvious for one of ordinary skill in the art to modify Duncan by adding flexure wave sensor disclosed by Smith for measuring mass changes by detecting resonant frequency changes.

Re claim 2, Duncan discloses phase difference between input signal and output signal is maintained at zero degree by the drive circuit (column 3 lines 35-54).

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Re claims 3-4, 11-12, 22-23, 24, 29 Duncan discloses phase difference between input signal and output signal is maintained at 90 or 180 degree ($\pi/2$ or π) by the drive circuit (column 3 lines 49-54).

Re claims 7,27 Duncan discloses phase delay adjustment circuit for adjusting phase difference (column 3 lines 43-45).

Re claims 8,28 Duncan discloses output signal is a sinusoidal voltage at a predetermined frequency (Fig. 3).

Re claims 10, Duncan discloses a voltage step module configured to offset the input voltage by a predetermined amount to offset the frequency and measure the corresponding phase detector circuit output change (column 5 lines 36-40).

Re claim 16, Duncan discloses sensor readout circuit continuously outputs a frequency representing the resonance frequency of the sensor (Fig. 3).

5. Claim 5-6, 9, 13-14, 19, 25, 26, are rejected under 35 U.S.C. 103(a) as being unpatentable over Duncan (US 6,041,642) and Smith (US 6,106,149) in view of Sauerland (US 3,840,804).

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Re claim 9, Duncan as modified by Smith disclosed all of the claimed limitations as set forth above except circuit suitable for operation in predetermined frequency range between 10 – 30 MHz.

Sauerland discloses piezoelectric resonator circuit suitable for operation in a predetermined frequency range of more than 200 MHz, which includes the range between 10 – 30 MHz.

Sauerland did not expressly disclose predetermined frequency is in the range 10 – 30 MHz.

[MPEP 2144.05 [R-1] Obviousness of Ranges: See MPEP § 2131.03 for case law pertaining to rejections based on the anticipation of ranges under 35 U.S.C. 102 and 35 U.S.C. 102/103. I. OVERLAP OF RANGES: In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)]

At the time of the invention it would have been obvious for one of ordinary skill in the art to modify Duncan and Smith by adding a sensor comprising a resonator having a predetermined frequency range disclosed by Sauerland for accurately measuring frequency in a range suitable for detecting mass changes of the particular substance.

Re claims 5-6, 13, 25-26, Duncan did not expressly disclose input voltage is offset 270° , and $0-360^{\circ}$ phase shift.

Sauerland discloses input voltage is offset 270° ($90 + n180^{\circ}$ where n is an integer) (column 3 lines 12-21).

At the time of the invention it would have been obvious for one of ordinary skill in the art to modify Duncan by adding 270^0 input voltage offset disclosed by Sauerland for obtaining a desired phase shift in the range $0-360^0$ phase shift.

Re claims 14,19 Duncan discloses all of the claimed limitations as set forth including bandwidth is proportional to Q/f_n but did not expressly disclose Q is calculated from the ratio of the offset of the voltage and the offset of the frequency.

Sauerland discloses Q_{eff} is calculated from the ratio of offset voltage and the offset of the frequency ($\Delta\theta/\Delta f$) (column 5 lines 25-35).

At the time of the invention it would have been obvious for one of ordinary skill in the art to modify Duncan by adding Q_{eff} calculated from the ratio of offset voltage to and the offset of the frequency disclosed by Sauerland to accurately calculate resonant frequency f_n (see Duncan column 1 lines 34-35).

Conclusion

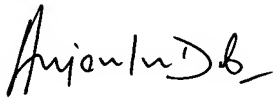
6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Adkins (US 6,823,720 B1) discloses sensor for detecting chemical substance by detecting resonant frequency changes due to mass loading of substance on surface of sensor by microfabricated resonator comprising flexural plate wave (FPW) resonator.

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Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Anjan K. Deb whose telephone number is 571-272-2228. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lefkowitz Edwards can be reached at 571-272-2180.



Anjan K. Deb

Patent Examiner

Art Unit: 2858

1/21/05

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